Universidad Rey Juan Carlos

TEACHING GUIDE

PROGRAMMING IN NETWORK ENVIRONMENTS

GRADO EN INGENIERÍA BIOMÉDICA (INGLÉS) (3º y 4º curso) (2374)

ACADEMIC YEAR 2026-27

Q2803011B UNIVERSIDAD REY JUAN CARLOS
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I.-Subject Identification	
Type	OBLIGATORIA
Teaching period	1 course, 2Q semester
Nº of credits	6
Language in wich the subject is taught	English

II.-Presentation

ATTENTION: GUIDELINES ON THE OPERATION OF THE COURSE FOR STUDENTS ENROLLED IN THIS SUBJECT AT THE ALCORCÓN CAMPUS
This subject, at the Alcorcón Campus, will be delivered at 25%. Although classes will be held in person at the Fuenlabrada Campus, students belonging to the Alcorcón Campus will be able to attend them remotely. Practical classes will also be conducted in person at the Fuenlabrada Campus; in this case, where logistics are more complicated, students will also have the option to attend remotely to benefit from general explanations and guidance.
Tutorials can also be conducted remotely.

The subject will train the student on different techniques for programming networked computer systems in the field of Biomedical Engineering.
Its main goals are:
•understanding the working principles of computers networks;
•learning how to create software applications over computer networks, in order to find solutions to current challenges set out in Biomedial Engieering.

The course will be **very practical**, with most of the sessions taking place in the laboratories and many of them including programming exercises. The only way of learning how to program is... programming.

III.-Learning outcomes

CB1. Proven knowledge and understanding of an area of study based on general secondary education and at a level which, although supported by advanced text books, also includes certain aspects that imply knowledge from the forefront of the field of study.
CB4 . That students are able to transmit information, ideas, problems and solutions to both specialized and non-specialized audience.
CB5 . That students have developed the learning skills needed to undertake further studies with a considerable degree of autonomy.
CE11. Identify, use and adapt telecommunication technologies that offer reasonable solutions to biomedical engineering problems
CE19. Use the fundamentals of programming for the development of computer programs in modern programming languages, as well as to understand and use different operating systems, databases and hospital information systems. To apply them in networks, systems and telematic services for hospital management.

- Key for degrees not adapted to RD 822/21: **CB** - basic competences, **CG** - generic competences, **CE** - specific competences, **CT** - transversal competences.
- Key for degrees adapted to RD 822/21: **CON** - knowledge, **COM** - competences, **HAB** - skills.

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IV.-Contents

IV.A.-Syllabus

The following concepts will be introduced and discussed:
1. Service Models.
2. Programming Techniques for Client-Server and P2P Applications.
3. Distributed Application Programming Techniques.
4. Techniques of Programming of Communications Protocols.
5. Network Security.
6. Object Oriented Programming.
7. UML.
8. Programming Web Applications.
9. Cloud Computing.

They are organized in the following training blocks:
•Presentation
•Block 0: Tools. Python 3, IDE (ex. PyCharm), Control version systems (Ej. Github/Gitlab)
•Block 1: Introduction to Object-Oriented Programing
•Block 2: Network Service Models
•Block 3: Communication Protocols Programming (TCP/HTTP)
•Block 4: Programming Web Applications
•Final Project

IV.B.-Training activities

Type	Title
Theoretical sessions	[AF01] Theoretical Classes. The professor explains the theoretical content and addresses questions.
Academic tutorials	[AF02] Tutorials. Sessions focused on clarifying specific course content or activities, either scheduled or requested by the student.
Individual work	[AF03] Theoretical Preparation and Readings. Individual study of course materials to prepare for class sessions.
Individual work	[AF04] Exam Preparation. Study of course materials to prepare for exams or assessments.
Test and/or exams	[AF05] Exams and Assessments. Evaluation of both theoretical and practical course content.
Experimental and/or technological laboratories	[AF07] Practical Classes. Completion of proposed exercises and practical activities
Individual work	[AF09] Practical Preparation. Individual work and study of course materials to prepare for practical sessions.

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V.-Student workload	
Theoretical sessions	24
Resolution of exercises, problems, case studies, etc.	0
Practical sessions in experimental, technological and clinical laboratories, fieldwork, etc.	30
Tests and/or exams	6
Academic tutorials	18
Related activities: conferences, seminars, etc.	0
Preparation of theoretical sessions and self-study	12
Preparation of practical tasks, exercises, case studies, projects, etc.	80
Preparation for tests and/or exams	10
Total student workload	180

VI.-Methodology and academic programme

Type	Period	Content
Theoretical sessions	Week 1 to Week 15	[M01] Theoretical sessions using audiovisual materials that may include slides, summary videos, etc.
Academic tutorials	Week 1 to Week 15	Students can request a personal or group online or face-to-face meeting with the tearcher if any help is needed.
Practical sessions	Week 1 to Week 15	[M03] Practical exercises and final project in a networked computer environment.

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VII.-Assessment methods

The general assessment method is continuous as established in the *Regulation for the Assessment of Learning Outcomes* of Rey Juan Carlos University.
All the assessment systems established in the degree report must be employed, except for those that have a minimum weight of 0%, which can be used by professors in the academic years they consider relevant. Each assessment system may be applied through one or more assessment activities, consistent with the system. No assessment activity can exceed individually 60% of the overall grade for the subject.
The sum of non re-evaluable activities cannot exceed 40% of the overall grade for the subject and, in general, should not have an established minimum grade (except for practical activities in which, strictly speaking, the conditions of the ordinary call cannot be reproduced in the extraordinary call).
Those students who do not manage to pass the subject in the ordinary call, or do not attend this first call, may attend the extraordinary call only for failed re-evaluable assessment activities.
The distribution and characteristics of the assessment activities are described below.

VII.A.-Description and weight of the assessment activities

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Continuous ordinary assessment

Evaluation system	Re-evaluable in Extraordinary	Weighting	Evaluation activity	Minimum grade	Contents	Date
[SE2] Exam on practical and theoretical concepts	Yes	60%	Test I (20%)	4	Content taught until the date of the test.	Midterm
			Test II (40%)	4	All content	End of the term
[SE5] Practical exercises	Yes. It will be evaluated with a similar work.	40%	Laboratory assignments (10%). Exercises programmed in Python and submitted for evaluation.	4	Practical exercises related to the contents of the session.	During the different practical sessions.
			Final project (30%). The project must be programmed in Python and submitted for evaluation.	4	Final project that covers different aspects taught during the development of the course.	During the last weeks of the term.

- The **final score** is calculated as the **weighted average** of the grades of the evaluation activities according to the indicated percentages.
- The subject is passed when the **global final score is greater or equal to 5.0**.
- If the score obtained in a re-evaluable activity is greater or equal to 4.0, such grade is kept for the extraordinary assessment period.
- If a minimum grade of 4.0 is achieved in all re-evaluable activities but the overall passing grade of 5.0 is not reached, only the "Test II" activity must be retaken during the extraordinary assessment period.
- If one or more evaluation activities have not been passed with the minimum grade, the final grade for the course will be the average grade of all the evaluation activities completed, with the understanding that it cannot exceed 4.
- If no evaluable activity has been taken, the final grade will be "Not Presented".
- **Final score**: 0.6 * practical and theoretical concepts + 0.4 * practical exercises.

Extraordinary assessment

- Both the practical exercises and the practical and theorical exam can be revalued.
- The same requirements apply as in the regular evaluation.

Early assessment

- The early assessment will follow the same criteria as the ordinary. The practical section (Practical exercises) will be assessed through the submission of a single practice, covering all the course content.

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Other observations

•If the professor considers it appropriate, he/she may request the in-person defense of one or some of the course evaluations: practices or exams.

VII.B. Assessment of students with academic exemption from class attendance

Having Academic Exemption from Class Attendance (DAAC) does not imply that students are automatically exempt from participating in the continuous assessment activities or in the training activities of compulsory attendance as established in the teaching guide. Once the exemption has been granted, students must contact the subject's teaching staff, who will propose the adaptations he/she may consider relevant, as long as they guarantee the acquisition and adequate assessment of the learning goals established. Students must maintain adequate communication with the teaching staff so that they may provide information on the dates for training and assessment activities, if these are not established in the programme and available for students at the time of achieving the exemption.
Subject with possibility of academic exemption: Yes.

VII.C. Review of assessment activities

In accordance with the Regulation for the Assessment of Learning Outcomes of Rey Juan Carlos University.

VII.D.-Students with a disability or special educational needs

In order to guarantee equal opportunities, non-discrimination, universal accessibility and academic success, students with disabilities or especial education needs may request curricular adaptations to follow their studies. These adaptations will be provided by the Unit of Attention to People with Disabilities of Rey Juan Carlos University, in accordance with the regulation which regulates the service for the Attention of People with Disabilities at the University. This Unit will issue a report for curricular adaptations, so that students with disabilities or special education needs must contact the service (at e-mail discapacidad.programa@urjc.es) in order to provide relevant information for different educational alternatives.

VII.E.-Academic behaviour, academic integrity and honesty

Rey Juan Carlos University is fully committed to the highest standards of academic integrity and honesty, so studying at the URJC means assuming and subscribing to the values of integrity and academic honesty set out in the University's Ethical Code. To support this process, the University has Rey Juan Carlos University's Academic Conduct Regulation as well as different tools (anti-plagiarism, supervision...) that offer a collective guarantee for the full development of these essential values.

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VIII.-Teaching resources and materials
Basic bibliography
Mark Lutz. Programming Python, 4th Edition. O'Reilly Media. 2010.
Mitchell L. Model. Bioinformatics programming using Python. O'Reilly Media. 2009.
Consultation bibliography
Jason M. Kinser. Python for Bioinformatics. Jones and Bartlett. 2008.

IX.-Professors	
Name and surname	JORGE BELTRÁN DE LA CITA
E-mail address	jorge.beltran@urjc.es
Department	Teoría de la Señal y Comunicaciones y Sistemas Telemáticos y Computación
Campus	Fuenlabrada
Category	Profesor/a Ayudante Doctor/a
Academic degree	Doctor
Person responsible for the subject	Yes
Tutorial timetable	Para consultar las tutorias póngase en contacto con el/la profesor/a a través de correo electrónico
Number of quinquennia	1
Number of sexennia	1
No. of positive evaluations by Docentia	0
Name and surname	JUAN DIEGO PEÑA NARVÁEZ
E-mail address	juan.pena@urjc.es
Department	Teoría de la Señal y Comunicaciones y Sistemas Telemáticos y Computación
Campus	Fuenlabrada
Category	Investigador
Person responsible for the subject	No
Tutorial timetable	Para consultar las tutorias póngase en contacto con el/la profesor/a a través de correo electrónico
Number of quinquennia	0

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No. of positive evaluations by Docentia	0

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